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BACON & THOMAS, PLLC
625 SLATERS LANE
FOURTH FLOOR
ALEXANDRIA, VA 22314-1176

EXAMINER	
LISTVOYB, GREGORY	

ART UNIT	PAPER NUMBER
1796	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/523,650	CAVAGLIA, GIULIANO	
	Examiner	Art Unit	
	GREGORY LISTVOYB	1796	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 May 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *56,59-63 and 84-118* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *56,59-63,84-113,117 and 118* is/are rejected.

7)☒ Claim(s) *114-116* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 56, 59-63, 84-92, 95, 100-107, 109-112, 118 rejected under 35 U.S.C. 103(a) as being unpatentable over Kerpes et al (US 5362844) herein Kerpes in combination with Coover et al (US patent 3075952) herein Coover and evidences by Jones (US patent 5409983) herein Jones .

Kerpes discloses a solid phase continuous process for PET production for bottles (meeting the limitations of new claim 118, modified with IPA (meeting the limitations of claims 89-90, see Example 1) ,

comprising the steps of:

preparing a mass of polyester prepolymer granules, comprising at least one polyester (see Example 1, particularly palletizing step);

feeding said polyester prepolymer granules with intrinsic viscosity within the range of 06-068 dl/g (meeting the limitations of claims 90-91, see Table 1) to a crystallizer and heating them to a temperature of about 185°C to about 189°C to cause

the crystallization of the granules (see Table 1, crystallization step and Column 2, line 45) (meeting the limitations of claims 59-60);

(Since Kerpes's and Application's conditions of crystallization are nearly identical, Kerpes's polyester has the same range of crystallization degree as one of the Application, meeting the limitations of Claims 61-63. Regarding Claim 103, since Kerpes uses the same temperature range for crystallization, residence time of 20 minutes is sufficient for crystallization.)

feeding crystallized granules into a reactor, producing a purge gas flow inside said first reactor to increase the intrinsic viscosity of said at least one polyester (see claim 1, limitation (f), "dealdehydization step at 175-225C, with purge of dry CO2, N2 or CO2 and their mixtures (meeting the limitations of claims 84-88),where intrinsic viscosity increases on 0.1 dl/g (see Table 1)).

Kerpes teaches that dew point of his dried gas is below -20C (see Column 4, line 45). However, use of the dried gas, which has a dew point below -30C is well known in the art. As evidenced by Jones, dried gas can have a dew temperature below -60C (see Example 1). (Note that Jones teaches dried air. However, it is obvious to an artisan to use an inert gas in order to exclude oxidation of the final product).

It would have been obvious to a person of ordinary skills in the art to use dried gas with dew point below -30C, since it accelerates the reaction, decreasing the residence time, which results in more economically sound process.

In reference to Claim 90, Kerpes teaches PET modified with 2.5% of Isophthalic acid (see Examples 1 to 3).

In reference to Claim 95, since carboxylic end groups content depends on Molecular weight of polymer. Since Kerpes discloses the same range of molecular weights, the content of end acidic groups is in the range of 10-45%.

Regarding new claim 117, Kerpes does not teach particular value for crystallization degree. However, the particle size and polymer IV and crystallization parameters are at the same range as one of the Application. Therefore, crystallization degree in both cases is expected to be at the same range. (Note that sufficiently crystallized PET particles are not sticky, while SSP for excessively crystallized material is more difficult, due to low diffusion of the rigid particles. Therefore, it is always important for an artisan to keep crystallization degree at optimum level).

Kerpes does not teach reactor design.

In particular, Kerpes does not teach post-crystallization process in an horizontal, cylindrical, rotary reactor, which is being slightly inclined.

Note, however, that any reactor can be considered as "slightly inclined", since ideal horizontal position is not achievable. Applicant supports the limitation above in Specification (see line 0049), disclosing 0.1-12 Degree angle slope. However, slope of 0.1 Degree practically means horizontal reactor, since this angle is within the measurement error.

In addition, Coover discloses a process for the solid phase continuous polymerization of polyesters, comprising the following steps:

Preparing a mass polyester prepolymer particles, comprising at least one polyester (see Examples 1A and 1B).

feeding crystallized particles at a temperature within the range 170 °C - 300°C (Column 2, line 25) into an horizontal, cylindrical, rotary reactor, which is being slightly inclined (Column 4, line 20 and Column 5, line 15) downwardly from a feeding end (Column 5, line 15); producing a purge gas flow inside said reactor (Column 2, line 25), which fluidize the particles; causing the intrinsic viscosity (IV) of polyester to increase typically on 0.4 units (column 5, line 35).

Regarding reactor design, Coover teaches that the tube can be designed so that the particles of prepolymer can remain in the reactor for the required period of time, while the tube is being rotated and moving the particles downwardly according to the degree of slope of the tube. By using of such a rotating tube apparatus the particles of

the polymer with substantially uniform intrinsic viscosity and relatively narrow molecular weight distribution is formed (see Column 5, line 25).

Use of horizontal, cylindrical, rotary reactor, which is being slightly inclined is beneficial, since it creates such reaction environment whch allow more effective removal of water and aldehydes, producing uniform intrinsic viscosity polymer with narrow molecular weight distribution.

Therefore, it would have been obvious to a person of ordinary skills in the art to use horizontal, cylindrical, rotary reactor in Kerpes's process, since this reactor design allows better removal of water vapors and aldehydes, producing uniform intrinsic viscosity polymer with narrow molecular weight distribution.

Regarding claims 109-111 relates to a process design (i.e. speed of reactor rotation and degree of reactor tilting). The position is taken that the above technological parameters can be adjusted by an artisan depending on the features of the specific process. The position is taken that an operator should organize process in such a way to provide optimal mixing of the granules in order to remove water vapors and aldehydes in most efficient manner. Therefore, rate of purging gas, rotation speed and tilting angle and other related parameters should be optimized with routine experimentation.

Regarding new claim 112, Coover teaches bed thickness 1-25% compare to reactor diameter (see Column 6, line 1), which is clearly below 4-5 m.

Regarding new claim 113, since Coover's reactor has the same design as one of the Application examined, the same granules behavior inside the reactor is expected.

Claims 93-94 rejected under 35 U.S.C. 103(a) as being unpatentable over Kerpes in view of Coover and Tung et al (US 4644049) herein Tung.

Kerpes discloses a solid phase continuous process for PET production, modified with IPA (meeting the limitations of claims 89-90, see Example 1),

comprising the steps of:

preparing a mass of polyester prepolymer granules, comprising at least one polyester (see Example 1, particularly palletizing step);

feeding said polyester prepolymer granules with intrinsic viscosity within the range of 06-068 dl/g (meeting the limitations of claims 90-91, see Table 1) to a crystallizer and heating them to a temperature of about 185°C to about 189°C to cause the crystallization of the granules (see Table 1, crystallization step and Column 2, line 45) (meeting the limitations of claims 59-60);

Coover discloses a process for the solid phase continuous polymerization of polyesters, comprising the following steps:

Preparing a mass polyester prepolymer particles, comprising at least one polyester (see Examples 1A and 1B).

feeding crystallized particles at a temperature within the range 170 °C - 300°C (Column 2, line 25) into an horizontal, cylindrical, rotary reactor, which is being slightly inclined (Column4, line 20 and Column 5, line 15) downwardly from a feeding end (Column 5, line 15); producing a purge gas flow inside said reactor (Column 2, line 25), which fluidize the particles; causing the intrinsic viscosity (IV) of polyester to increase typically on 0.4 units (column 5, line 35).

Coover and Kerpes both disclose a process for the solid phase continuous polymerization of Polyethylene terephthalate.

Coover and Kerpes do not teach a solid state polymerization process for Polybutylene terephthalate and Polyethylene naphthalate.

However, solid state polymerization process for the above polymers is well known in the art.

Tung discloses such a process for Polybutylene terephthalate (PBT) (see Column 2, line 20) and Polyethylene naphthalate (PEN) (see Claim 3). Processes for production of PET, PBT and PEN share the same common features. The only

difference is that the artisan should adjust technological parameters depending on the type of the polymer and its grade.

Therefore, it would have been obvious to a person of ordinary skills in the art to apply Coover/Kerpes process to Polybutylene terephthalate and Polyethylene naphthalate in order to increase diversity and applicability of the process.

Claims 93, 96-100 rejected under 35 U.S.C. 103(a) as being unpatentable over Kerpes in combination with Coover and Duh et al (US patent 5449701) herein Duh.

Coover and Kerpes disclose the solid-state polymerization of polyesters (see discussion above).

Coover and Kerpes do not teach the shapes of the particles.

Duh discloses a solid-state polymerization for polyethylene naphthalate. He teaches that feeding prepolymer typically contains solid granules in the shape of pellets, spheres, chips or cubes. Those shapes are advantageous since the formation of undesirable very high molecular weight fraction is reduced (column 1, line 20).

Duh teaches that although at smaller particle size the reaction is more effective due to better diffusion, very small particles has a tendency to stickiness. Therefore there is a limitation for minimal particle size in solid state polymerization (column 1, line 30).

In addition, shape of the particles may play an important role in diffusion processes.

Therefore, it would have been obvious to a person of ordinary skills in the art that particle size and shape (i.e. surface area at given mass) is the most important factor for diffusion of water from the particles. At high surface area equilibrium of post polymerization reaction shifts to molecular weight increase, which makes a process more efficient.

Claim 95 rejected under 35 U.S.C. 103(a) as being unpatentable over in Kerpes combination with Coover and Scannapieco (US 4849497) herein Scannapieco.

Coover and Kerpes disclose a process for the solid phase continuous polymerization of polyesters (see discussion above).

Coover and Kerpes do not disclose that carboxyl end group content should be within the range of 10-45%.

Scannapieco discloses a process for the solid phase continuous polymerization of polyesters.

Scannapieco teaches that carboxyl end group content should be less than 30% in order to achieve high rate of the post-polymerisation.

Therefore, it would have been obvious to a person of ordinary skills in the art to use prepolymer with carboxyl acid group content below than 30% in order to achieve high rate of the polymerization.

Allowable Subject Matter

Claims 114-116 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

In particular, Kerpes or Coover does not teach multiple reactors in series.

Response to Arguments

Applicant's arguments filed 5/18/2009 have been fully considered but they are not persuasive.

Applicant submits the Declaration, signed by Dr. Callander.

Dr. Callander states that Kerpes's and Coover's processes are nor combinable, because during the Kerpes's SSP process , IV increases only slightly, whereas Coover's method designs for high IV lift (at least 0.3 units). Therefore, particle size in the above processes should be different. Dr. Callander concludes that modification with Coover may destroy Kerpes's process.

However, Examiner uses Coover for the purposes of the reactor modification. It is clear that Coover's design produces better mass transfer, compare to the regular one. In particular, it provides better and more uniform contact of all particles with drying gas.

Regarding reactor design, Coover teaches that the tube can be designed so that the particles of prepolymer can remain in the reactor for the required period of time, while the tube is being rotated and moving the particles downwardly according to the degree of slope of the tube. By using of such a rotating tube apparatus the particles of the polymer with substantially uniform intrinsic viscosity and relatively narrow molecular weight distribution is formed (see Column 5, line 25).

Use of horizontal, cylindrical, rotary reactor, which is being slightly inclined is beneficial, since it creates an reaction environment, allowing more effective removal of water and aldehydes, producing uniform intrinsic viscosity polymer with narrow molecular weight distribution.

Besides, as stated in the Rejection above, any reactor can be considered as "slightly inclined", since ideal horizontal position is not achievable. Applicant supports the limitation above in Specification (see line 0049), disclosing 0.1-12 Degree angle slope. However, slope of 0.1 Degree practically means horizontal reactor, since this angle is within the measurement error.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to GREGORY LISTVOYB whose telephone number is (571)272-6105. The examiner can normally be reached on 10am-7pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, James Seidleck can be reached on (571) 272-1078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/James J. Seidleck/
Supervisory Patent Examiner, Art Unit 1796
GL